EXPLANATION OF SIGNIFICANT DIFFERENCES

for

Martin Marietta Reduction Facility

The Dalles

Wasco County, Oregon

Approved by:

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Date:

10/6/17

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Acronyms

ARAR	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
LCS	Leachate Collection System
LTS	Leachate Treatment System
NAC	Northwest Aluminum Company
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
ODEQ	Oregon Department of Environmental Quality
PAH	Polynuclear Aromatic Hydrocarbon
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision

I. Introduction to the Site and Statement of Purpose

This decision document presents an Explanation of Significant Differences (ESD) for the Lockheed Martin Corporation, former Martin Marietta Reduction Facility Superfund Site (the Site). The Site is located in The Dalles, Wasco County, Oregon. The U.S. Environmental Protection Agency (EPA) is the lead agency. The Oregon Department of Environmental Quality (ODEQ) is a support agency.

This ESD is issued in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. § 9601 *et seq*., as amended, hereafter CERCLA, Section 117(c) of CERCLA, 42 U.S.C. §9617(c), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 C.F.R. § 300.435(c)(2)(i).

A Record of Decision (ROD) was signed documenting the selection of the remedy to clean up the Site in 1988. An Explanation of Significant Differences (ESD) was issued in 1994 requiring a change in the treatment method for landfill leachate and an increase in treatment capacity to ensure adequate treatment of cyanide. The ESD also documented remedial actions that had been taken at the Lined Pond, the Discharge Channel and the Recycle Pond. These units had been taken out of service after the 1988 ROD and were not addressed by the ROD.

As a result of the 2013 five-year review, EPA determined that the effectiveness of the leachate treatment system being employed was not fully understood and recommended that alternative methods to treat cyanide present in leachate from the CERCLA landfill be evaluated. A feasibility study (FS) was prepared to evaluate alternatives for leachate treatment (CDM Smith 2013). Based on a subsequent laboratory bench-scale study, ion exchange resin media was selected to be pilot tested as an alternative leachate treatment technology at the Site (CDM Smith, 2014). A pilot-test treatment system (also known as the temporary LTS) using ion exchange resin media began operation in November 2014 following design and construction. Based on the successful results of the pilot test, this ESD modifies the ROD to select ion exchange resin media treatment as the leachate treatment method. The remedy component for leachate treatment continues to be part of the selected remedy and other requirements specified in the ROD as revised by the 1994 ESD remain unchanged. While this change in treatment method is significant, it is not a fundamental change to the selected remedy.

This ESD also clarifies that ACLs established for the S aquifer do not apply to the Perched Zone. While the ROD identified specific areas of perched water (old cathode waste pile, salvage area, and potliner handling areas), the comprehensive groundwater investigation conducted from 2014 to 2016, confirmed that the perched water is a separate groundwater zone that is not part of or hydraulically connected to the S aquifer, does not have sufficient yield to be considered a drinking water source, and is not impacting the Columbia River.

This ESD and supporting information will become part of the Administrative Record for the Site as required by 40 C.F.R. §§ 300.435(c)(2)(i)(A) and 300.825(a)(2). The Administrative Record can be accessed online at http://www.lockheedmartin.com/us/who-we-are/eesh/remediation/the-dalles-.html. The official information repository for the Site is at The Dalles-Wasco County Library located at 722 Court St. in The Dalles, Oregon. Library hours are Monday through Thursday from 10:00am to 8:30pm and Friday through Saturday from 10:00am to 6:00pm. The Administrative Record can be accessed there online. A public notice that provides a brief summary of the ESD, including the reasons for the ESD, will be published as required by 40 C.F.R. § 300.435(c)(2)(i)(B).

II. Site History, Contamination, and Selected Remedy

The following sections provide a summary of Site history, how the Site became contaminated, and lists the components of the selected remedy for the Site in the 1988 ROD and 1994 ESD.

Site History and Contamination

The Lockheed Martin Corporation (Lockheed Martin) facility, also known as the Former Martin Marietta Reduction Facility, is located in The Dalles, Wasco County, Oregon. Harvey Aluminum Incorporated began aluminum production activities at the Site in 1958 and later became a wholly owned subsidiary of Martin Marietta Corporation. Martin Marietta Corporation continued aluminum production activities until 1984, when the plant was shut down. In 1986, Martin Marietta Corporation leased the aluminum production plant to Northwest Aluminum Company (NAC). NAC purchased the plant, not including the Site waste management units, in 1990 and continued aluminum manufacturing until filing for bankruptcy in 2003. Parcels have been subsequently sold by NAC to other owners including Sapa Extrusions. After a corporate merger in 1995, Lockheed Martin became the successor to Martin Marietta Corporation at the Site. Lockheed Martin as successor to Martin Marietta, has retained ownership of property encompassing the waste management units

Widespread soil and groundwater contamination from aluminum production processes occurred at the Site. Spent potliner or "cathode waste," which contained cyanide, fluoride, sodium and sulfate, was generated during the aluminum production process. Cathode waste included a Resource Conservation and Recovery Act (RCRA) listed hazardous waste -K088. During facility operation, these wastes were stored and disposed of on the property. Cyanide compounds, fluoride, sulfate, PAHs and arsenic were the contaminants of concern identified at the Site.

The Site was listed on the CERCLA National Priorities List (NPL) in 1987 after cyanide compounds were detected in groundwater. In 1988, a ROD was signed selecting the remedy to clean up the Site. In 1989, the United States on behalf of the EPA, the State of Oregon on behalf of the Oregon Department of Environmental Quality (ODEQ), and Martin Marietta Corporation and Commonwealth Aluminum Corporation entered into a judicial Consent Decree which required Commonwealth Aluminum Corporation and Martin Marietta Corporation, succeeded by Lockheed Martin, to implement the remedial action selected in the ROD.

An unlined landfill used to dispose of construction debris and cathode waste, referred to as the CERCLA landfill, is addressed by the ROD. Another landfill, referred to as the RCRA landfill, at the center of the site that primarily contains spent potliner is not addressed by the ROD or the 1994 ESD. It was closed as a RCRA landfill pursuant to ODEQ hazardous waste closure requirements. Leachate from that unit, was collected and transported to the CERCLA landfill leachate treatment system at the CERCLA landfill for treatment. Leachate from the RCRA landfill is no longer being transported to the CERCLA landfill leachate treatment system for treatment.

In 1995, EPA issued a Certificate of Completion for the remedial action based on a demonstration that performance standards in the ROD and ESD had been met. EPA noted that post-remedial care must continue, including operation and maintenance and groundwater monitoring. In 1996, the Site was deleted from the NPL, but ongoing groundwater monitoring and operation and maintenance continues to the present date. Reviews of the remedy are required by CERCLA every five years to assess protectiveness of human health and the environment. Ongoing monitoring and operation and maintenance, including maintenance of the CERCLA landfill cap and the soil covers over Scrubber Sludge Ponds 2 and 3, treatment of CERCLA landfill leachate and perched water from east of River Road and from the former Cathode Waste Management Areas, groundwater monitoring, and implementation of institutional controls to restrict groundwater and land use will all continue indefinitely.

Selected Remedy

On September 29, 1988, the EPA signed a ROD documenting the selection of the remedy to clean up the Site. Remedial action objectives (RAOs) for the Site included both the control of sources of contamination as well as groundwater management for the protection of human health and the environment. Specific objectives in the 1988 ROD for source control at the Site included:

- Protection of human health and the environment from potential adverse effects caused by direct dermal contact with contaminants in soil.

- Protection of human health and the environment from potential adverse effects due to exposure to airborne contaminants.

- Minimization of the migration of contaminants from the source areas to the groundwater system, surface water, or soils.

- Restoration of groundwater to cleanup levels identified in the ROD.

The selected remedy in the 1988 ROD included the following components:

- Consolidate the residual cathode waste material and underlying fill material from the former Cathode Waste Management Areas into the existing CERCLA landfill (completed in 1991);

- Consolidate the cathode waste material from the Unloading Area into the existing CERCLA landfill (completed in 1989);

- Cap the existing CERCLA landfill in place with a multi-media cap meeting RCRA performance criteria (completed in 1991);

- Place a soil cover over the Scrubber Sludge Ponds 2 and 3 (completed 1989);

- Plug and abandon nearby production wells and connect users to the City of The Dalles water supply system (completed from 1990 to 1994);

- Collect and treat leachate generated from the CERCLA landfill, and perched water from east of River Road and from the former Cathode Waste Management Areas (ongoing);

- Recover and treat contaminated groundwater from the Unloading Area (determined not necessary in the 1994 ESD after removal of source material);

- Conduct groundwater quality monitoring and develop a contingency plan to perform additional recovery of groundwater in the event that further contamination is detected above ARARs or health based standards in the A or B aquifers beneath the landfill (contamination was not detected in these aquifers); and

- Institutional controls such as deed restrictions and fencing will be implemented during and after remediation. The purpose of these controls will be to assure that the remedial action will protect public health and the environment during its execution, and to ensure a similar level of protection after the remedial actions have been implemented. The ROD states that institutional controls such as deed restrictions will be established on-site to prevent the installation of wells that draw water from the S aquifer (ongoing).

An Explanation of Significant Differences (ESD) was issued in 1994 requiring a change in the cyanide leachate treatment method and an increase in treatment capacity to ensure adequate treatment. The ESD also documented remedial actions that had been taken at the Lined Pond, the Discharge Channel and the Recycle Pond. These units had been taken out of service after the 1988 ROD and were not addressed by the ROD. The 1994 ESD included the following components:

- Modify the Leachate Collection System (LCS) and improve the surface water drainage system to reduce groundwater infiltration into the system (completed in 1993);

- Employ thermal rather than chemical oxidation treatment of cyanide in leachate in a Cyanide Destruct System (CDS) with increased capacity to meet the performance standard of 0.1mg/L free cyanide established when an NPDES discharge permit was issued in 1989 (CDS installation completed 1994);

- Discontinue efforts to recover and treat contaminated groundwater from the Unloading Area due to low levels of fluoride (discontinued in 1994);

- Remove sludge and liner from the Lined Pond and dispose of it in the existing CERCLA landfill and conduct sampling to verify that remaining chemical concentrations were below concentrations established in the ROD and RD/RA Statement of Work (completed in 1989);

- Flush sediments in the upper portion of the Discharge Channel to the Recycle Pond and remove surface waters and discharge them to Columbia River under the existing National Pollutant Discharge Elimination System (NPDES) permit (completed in 1991); and

- Dewater sludge in Recycle Pond followed by removal of the sludge from the Recycle Pond and lower portion of the Discharge Channel for consolidation in the northern portion of Scrubber Sludge Pond 3 (completed in 1991).

In 1996, the Site was deleted from the NPL; however, ongoing monitoring of groundwater and operation and maintenance of the CERCLA landfill and scrubber sludge ponds continues to the present date. CERCLA requires a review of the remedy at a minimum of every five years.

In 2004, a Memorandum of Agreement (MOA) between EPA and ODEQ allowed for the primary oversight of the CERCLA monitoring and operation and maintenance and related RCRA work to be carried out by ODEQ through a RCRA Post-Closure and Corrective Action Permit (RCRA Permit). EPA terminated the MOA with ODEQ on October 4, 2012. The RCRA permit is still active at the Site and administered by ODEQ. EPA maintains CERCLA authority at the Site.

III. Basis for the Document

The 1988 ROD anticipated that leachate volumes would decrease over time and would no longer require treatment. The 1994 ESD recognized that a different leachate treatment method for cyanide was needed, and that leachate volumes were not decreasing due to the contribution of shallow groundwater to the leachate collection system and that leachate treatment would be required into the future.

From 2004 to 2012, modification of the leachate treatment system occurred pursuant to ODEQ approved RCRA permit modifications. Table 1 presents a summary of those changes.

Table 1. Summary of Changes to Leachate Treatment

Year	Decision Document	Remedy Selected/Description of Change
1988	Record of Decision	On-site aqueous treatment system including a chemical oxidation unit for destruction of cyanide followed by a chemical precipitation unit to remove fluoride with discharge to surface water.
1994	Explanation of Significant Difference	Increased leachate treatment capacity and use of the thermal treatment to meet the performance standard of 0.1mg/L free cyanide. Referred to as Cyanide Destruction System (CDS).
2002	RCRA Permit Modification	ODEQ approved use of biotreatment technology to replace thermal treatment and shutdown of the CDS in May 2002. Included land applications of nutrients to the CERCLA landfill to enhance biological activity within the leachate collection system (LCS). Discharge of treated effluent pursuant to NPDES permit.
2004	RCRA Permit Modification	Enhanced biological treatment program was expanded to include direct nutrient application into the former CDS tank, which was converted for use as the batch treatment tank, to reduce cyanide concentrations to a level below the discharge

		limit. Continued discharge pursuant to NPDES permit.
2014	RCRA Permit Modification	ODEQ approved use of temporary leachate treatment system (LTS) using ion exchange resin technology to replace biological treatment.
2017	Explanation of Significant Difference	Selects ion exchange resin media technology treatment system to treat cyanide in leachate and discharge of treated leachate to the City of The Dalles wastewater system in accordance with applicable administrative and substantive requirements.

As a result of the 2013 five-year review, EPA determined that the effectiveness of the leachate treatment system being employed was not fully understood and recommended that alternative methods of treatment for cyanide present in leachate from the CERCLA landfill be evaluated. An FS was conducted to evaluate alternatives for leachate treatment. The *Leachate Treatment Feasibility Study, Lockheed Martin Corporation, The Dalles, Oregon* was finalized on September 13, 2013. An ion exchange resin media was successfully tested during a bench-scale laboratory study as an alternative technology at the Site (CDM Smith, 2014). A pilot-test treatment system using ion exchange resin media began operation in November 2014 following design and construction.

Testing of the performance of the pilot ion exchange treatment system occurred from November 11, 2014, through November 30, 2015 and is documented in the *Performance Report for the Temporary CERCLA Landfill Leachate Treatment System or the Former Martin Marietta Corporation Reduction Facility in The Dalles, Oregon* (AMEC, 2015b). During this time, the temporary LTS met or exceeded design specifications for effluent treatment and resin life. The temporary LTS was designed to treat over 1,000,000 gallons of leachate per year based on the known leachate flow characteristics over the course of a year. Since the flow varies with seasonal precipitation, the design was based on an average flow ranging from 0.4 to 5.0 gpm, with flow assumed to occur 120 days per year. The system was designed to accommodate sustained maximum flows during periods of high precipitation. The pilot test demonstrated that the ion exchange resin treatment system can meet the NPDES performance standard of 0.1 mg/L free cyanide. All effluent samples collected and analyzed for total and weak acid dissociable (WAD) and free cyanide were below the performance standard. In 2017, leachate discharge through the NPDES permit was discontinued and discharge through the City of The Dalles sewer system was implemented. The 2016 industrial wastewater discharge permit issued by the City of The Dalles lists a daily maximum limit for total cyanide at 0.33 mg/L.

This ESD clarifies that ACLs established for the S aquifer do not apply to the Perched Zone. While the ROD identified specific areas of perched water (old cathode waste pile, salvage area, and potliner handling areas), it did not establish a perched water zone. The designation of a Perched Zone as separate from the S aquifer is important since the Perched Zone contains pockets of higher concentrations of contamination. Due to the lack of direct hydraulic connection, performance standards for the S aquifer included in the ROD are not applicable to the Perched Zone. Data collected during the 2014 to 2016 groundwater investigation show that Perched Zone and S Aquifer impacts do not extend laterally to the Columbia River. The perimeter drain system used for collection of leachate from the CERCLA landfill is comprised primarily of shallow groundwater from the Perched Zone. This perimeter drain system serves

as a hydraulic containment system capturing Perched Zone groundwater beneath the landfill, from upgradient areas to the west, with a capture zone that also extends for short distances to the north, east and south. Groundwater collected from the Perched Zone and treated through the LTS will meet the discharge limitations specified in the industrial wastewater discharge permit issued by the City of The Dalles.

IV. Description of Significant Differences or New Alternatives

The significant differences documented in this ESD are as follows:

- An ion exchange resin media technology treatment system shall be used to treat cyanide in CERCLA landfill leachate and Perched Zone groundwater in the vicinity of the CERCLA landfill in accordance with a revised RD/RA Work Plan approved by EPA under the Consent Decree.

- Treated leachate shall be discharged to the City of The Dalles wastewater system in accordance with all applicable administrative and substantive requirements. The 2016 industrial wastewater discharge permit issued by the City of The Dalles lists a daily maximum limit for total cyanide at 0.33 mg/L.

- The treatment system shall consist of particle bag filters, which remove sediment and particles, and then ion exchange resin media vessels that treat cyanide in the leachate. Leachate shall be pumped through particle bag filters which can be operated in series or parallel. Following particle filtration, the leachate shall pass through two ion-exchange resin vessels in series (lead and lag positions). The effluent from the second ion exchange vessel shall be directed through a third particle bag filter which primarily serves as a resin media trap.

The *Permanent Leachate Treatment System Final 90% Basis of Design Report* provided the details for the ion exchange treatment system that has been installed at the Site (AECOM, 2016). The design includes system modifications and modifications to the storage and containment areas of the system. Previously, treated leachate was discharged under a National Pollution Discharge Elimination System (NPDES) permit to the Columbia River pursuant to a RCRA permit modification. Lockheed Martin has discontinued direct discharge of treated leachate to the Columbia River through the NPDES permit and instead discharges treated leachate to the City of The Dalles wastewater collection and treatment system through an industrial wastewater discharge permit.

The temporary treatment system design and construction total cost was $222,751 and was constructed in 2014. The permanent treatment system design and construction total cost is estimated to be $790,615, with costs incurred in the amounts of $50,910 in 2015, $284,914 in 2016, and $454,791 estimated to be incurred in 2017. The total costs for design and construction to connect to the City of The Dalles wastewater treatment system is estimated to be $1,330,262 with costs incurred in the amounts of $122,405 in 2015 and $1,207,857 in 2016. The annual estimated O&M cost for the permanent treatment system is $87,169 and includes; inspections, POTW discharge, inspections, and compliance reporting; laboratory analyses; system improvements; and reporting and data management. The total estimated annual O&M cost for the Site is $115,735.

It is anticipated that the ongoing monitoring and operation and maintenance of the remedy, consisting of maintenance of the CERCLA landfill and scrubber sludge ponds soil cover, treatment of CERCLA landfill leachate, groundwater monitoring and implementation of institutional controls to restrict groundwater and land use, will continue indefinitely.

V. Support Agency Comments

EPA consulted with the ODEQ in accordance with the NCP 40 C.F.R. § 300.435(c)(2) and Section 121(f) of CERCLA, 42 U.S.C.§ 9621(f). ODEQ was provided an opportunity to comment on the ESD. ODEQ commented that they did not have concerns with the need to identify an alternative technology for treating cyanide in leachate from the CERCLA landfill.

VI. Statutory Determinations

EPA has determined that the ROD as modified by the 1994 ESD and this ESD complies with the statutory requirements of Section 121 of CERCLA, 42 U.S.C. § 9621, is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

VII. Public Participation Requirements

The public participation requirements set out in the NCP, 40 C.F.R. § 300.435(c)(2)(i), have been met by publishing this ESD, making it and supporting information available to the public in the Administrative Record and at the information repository. The Administrative Record can be accessed online directly and at the information repository at http://www.lockheedmartin.com/us/who-we-are/eesh/remediation/the-dalles-.html. The information repository is located at:

The Dalles-Wasco County Library
722 Court St.
The Dalles, Oregon 97058

A notice summarizing the ESD will be published in a major local newspaper, The Dalles Chronicle.

VIII. References

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